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Exchange Rate Regimes and Real Sector Performance in Nigeria: A Disaggregated Approach

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Abstract

Exchange rate is significant for the performance of real economy and the choice of exchange rate regime is crucial to the success of government effort to revamp the various sub sectors of the Nigerian real economy. An import dependent country like Nigeria usually battles to cope with exchange rate volatility which often time put the monetary authority on the spot. As a matter of fact, various policy efforts of the Central Bank of Nigeria to achieve macroeconomic stability, recovery and overall sustainable development have not yielded tangible results. The presence of sector-specific variation and sensitivity of the real sector to the real effects of exchange rate changes is another huge problem for many developing economies. Consequently, this study investigates the effects of Exchange rate regime on the performance of the outputs of the five sectors of the Nigerian real economy, namely: agriculture, industry, building and construction, wholesale /retail trade and services. The study covers a time period Fifty -Seven (57) years (1961-2017); divided into two Exchange rate regimes: Fixed/Regulated Exchange Rate Regime (1961-1986) and Flexible/Guided Deregulated Exchange rate regime (1987-2017). The study adopts the modified Mundell-Fleming IS-LM framework in an open economy using the Structural Vector Autoregressive (SVAR) estimation technique. The results of the study reveal that the exchange rate channel is the most effective policy transmission channel to all the five sectors and that a long term relationship exists between exchange rate and the real sector output in Nigeria. The results also establish existence of a clear evidence of differential impact of exchange rate regimes on the dynamics of outputs of the five disaggregated real sectors in Nigeria. The study therefore recommends that the monetary authorities should re-appraise the existing exchange rate policies in Nigeria with the intention of strengthening the controls and interventions to make them more effective and impact positively on the real sector of the economy. The government should also design and develop a broad programme of stimulating domestic productions to increase exports, eliminate non-productive imports and create employment. There is also the need to put in place and implement proactive and harmonized macroeconomic policies that would attract foreign private investment, increase foreign exchange earnings, stimulate exchange rate stability, reduce poverty level and spur overall economic development.

Key words: Exchange rate; Regulated and guided deregulated regime; Nigerian real sector

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1. BACKGROUND TO THE STUDY

Nigeria is a huge economy that is vastly endowed with abundant natural and human resources with highly diversified agro-ecological conditions (National Bureau of Statistics, 2014). The real sector is the pillar that holds the government's objectives of inclusive growth and poverty reduction and a vibrant real economy creates more activities channels in the economy and promotes internal and external balance (Anyanwu, 2010; Ibadin, Moni & Eikhomun, 2014). Sanusi (2011) classified the Nigeria real sector into agriculture, industry, building and construction and services. However Mordi *et al*. (2013) and Amoo *et al.* (2014) extended this scope to include

agriculture, industry, building and construction, wholesale and retail and services in consistent with the Central Bank of Nigeria (CBN) reporting format. The Nigerian real sector had performed poorly relative to her enormous resource endowment; the weak performance due largely to lack of proper exchange rate policy management (Odusola, 2006; Umar & Soliu, 2009; Sanusi, 2010). The exchange rate policy a country adopts has a strong impact on the real sector and on the whole economy through its effect on domestic prices, national output, international trade, financial markets and employment (Stockman, 1999; Harris, 2002; Aliyu, 2008). Exchange rate policy therefore maintains central stage in the post- crisis environment especially for emerging economies (Klein & Shambaugh, 2010; Rose 2011). Calvo and Reinhart (2002) held that exchange rate regime varies with the level of financial development in developing economies (Nigeria inclusive) and that the choice of exchange rate regime stands as one of the most contentious aspect of macroeconomic policy. Nwosa and Saibu (2012) argued that exchange rate and interest rate as the most effective monetary tools that influence influence sectoral output growth in Nigeria.

1.1 Statement of Problem and Objectives of Study

Exchange rate has a critical influence on the real output performance and the activities of several other macroeconomic variables, especially in a country like Nigeria which had pursued economic growth while battling with high reliance on imports (Oyejide, 1985; Adeniyi, 2012). The achievement of effective exchange rate policy has therefore become a major challenge Nigerian monetary authority (Central Bank of Nigeria) battles over a few years and volatility of exchange rate has subjected the real sector and its component units to a below par performance (Opaluwa, Umeh& Abu, 2010; Fapetu & Oloyede, 2014). Several of Nigeria current problems like hyper inflation, rising cost of living, infrastructural collapse to mention a few are related largely to the exchange rate instability with the CBN working assiduously to defend the naira in the face of unhealthy speculation and corruption in the exchange market (Olajide, 2016). According to Ayodele (2004) the performance of Nigeria real sector is hampered due to several problems ranging from exchange rate volatility, feeble industrial base, low productivity in agriculture, import dependence, high external debt and inefficient public. It is therefore logical to assert that the successive exchange rate policies in Nigeria have not guided Nigerian real sector to the desired position. Olorunfemi and Fatukasi (2011) blamed the unabated depreciation in Naira on the continuing disappearance of the traditional exports and absolute reliance on increasingly uncertain and erratic oil for foreign exchange earnings. Generally, the successive exchange rate policies in Nigeria have not guided the real sector to the desired position (International Monetary Fund, 2017).

Despite the situations discussed above, empirical evidences on the aggregate and sectoral responses to exchange rate regimes are scanty. Most of existing studies had largely focused on the relationship between exchange rate and the aggregate output on one hand and the single sector component of real economy on the other hand. Again, existing studies had not explored the possibility that there could be differences in the impact of exchange rate regime on the various sectors of the Nigerian real economy. However, in reality, differences in sector configuration suggest that the impact of exchange rate regime could vary substantially on the aggregate output and the outputs of the sectors. Departures from the extant literature were Yaqub (2010) and Olajide (2016) which considered the sectoral perspective of this subject but focused on just three sectors - Agriculture, Manufacturing and Service. Moreover, detailed knowledge of the sectoral dimension is essential, given the fact that the various sectors may react differently to exchange rate changes and that the difference in responses could have huge implications for employment, income distribution and poverty, all of which are of crucial significance in a typical developing nation. Against this backdrop and given the significant of a disaggregated study, the broad objective of this research is to examine the effects of Exchange rate regimes on the performance of the outputs of the five sectors of the Nigerian real economy, namely: agriculture, industry, building and construction, wholesale /retail trade and services.

The specific objectives of the study include to:

i: Investigate the existence of long run relationship between exchange rate and real sector output in Nigeria

ii: Evaluate the performance of the different components of real output in the regulated and guided deregulated exchange rate regimes in Nigeria.

The following hypotheses which are all in null form were formulated and tested in the study:

i: There is no long run relationship between exchange rate and Aggregate Real Output Performance in Nigeria

ii: There is no significant difference between the performance of outputs of various components of the real sector in Nigeria under regulated exchange rate regime and deregulated exchange rate regime

1.2 Significance of the Study

The significance of this study is predicated on the prominence of the relationship between exchange rate and the outputs of the real sector and the fact that it extends literature in the area of sectoral and regime perspectives of the subject which has not enjoyed adequate coverage in Nigeria. This study is country-specific, focusing on the Nigerian economy with the spotlight on the response of the five sectoral component of Nigeria real economy which are Agricultural, Industrial, Building & Construction, Wholesale & Retail Trade and Services sectors to exchange rate between 1961- 2017; making a

time horizon of Fifty -Seven (57) years. The period was further divided into two Exchange rate policy regimes: Fixed/Regulated Exchange Rate Regime (1961-1986) and Flexible/Guided Deregulated Exchange rate regime (1987-2017) so as to capture the effect of policy direction with the introduction of Structural Adjustment Programme (SAP) in 1986. The choice of the period was based on the need to cover the period Nigeria took charge of her monetary policy management. The study would serve as a very relevant policy guide for policy makers in Nigeria and other developing Countries.

2. REVIEW OF EXTANT LITERATURE ON EXCHANGE RATE VARIATIONS AND REAL SECTOR PERFORMANCE

The relationship between exchange rate and real sector performance has attracted huge attention in the literature for both developing and developed economies. The topic continues to enjoy growing volume of theoretical as well as empirical studies. However, the controversy as to whether or not exchange rate system determines the performance of the real economy is far from been resolved on both theoretical and empirical sides of literature. Again, majority of theoretical and empirical investigations of exchange rate policies to date have dealt primarily with aggregate output and paid little attention to sectoral dimension. This is astonishing, given the significant distinction and interdependence among the sub-sectors of the real economy and the implications of this on the general working of a nation's real economy. This section looks at the conceptual review, theoretical review/framework and the review of empirical studies on the subject matter.

2.1 Conceptual Literature

Exchange rate is the price of one currency in terms of another. In the Nigerian context, it is the units of naira needed to purchase one unit of another country's currency e.g the United States' dollar (Oloyede, 2002; Campbell, 2010; Ngerebo-a &Ibe, 2013).The general definition of exchange rate is a reflection of the strength of a domestic currency when measured against another country's (trading partner) currency (Jhingan, 2003). Exchange rate is therefore important to the understanding of the growth path of a nation and its misalignments can lead to contraction in output and widespread economic hardship (Umar & Soliu, 2009). The recent experiences of the developing countries have showed that exchange rate is a potent policy instrument of achieving balance of payment adjustment, diversification, liberalization, structural adjustment programmes and total overhauling of the economy (Asitkoglu & Uctum, 1992; Obadan, 1993). The major determinant of exchange rate is the interplay between the forces of demand and supply. Other factors include; domestic production, balance of payment position, the amount of foreign exchange earnings, market expectations, the level of external reserves in a country and socio-political climate. When a country's exports exceeds its imports, the country earns more foreign exchange and its external reserves grows but when a country's exports fall below imports, the country could resorts to its foreign reserves to manage the deficit leading to depreciation in the value of domestic currency. (CBN, 2012).

Exchange rate policy covers the design, programmes, strategies and system to ensure a stable and effective exchange rate for the country's domestic currency, in consonance with overall macroeconomic policy objectives (Mordi, 2006). An exchange rate regime simply refers to the system adopted by a country's monetary authority (usually the Central Bank) to determine the value of its currency in relation to other nations' currencies. Traditionally, exchange rate regimes are classified into fixed and flexible regimes on the basis of the degree of flexibility the central bank shows towards changes or variations in the exchange rates (CBN, 2016). However, in recent times, the IMF has reclassified the regimes into three broad categories, the hard exchange rate pegs, soft exchange rate pegs, and floating exchange rate regimes based on observed country's practices and the degree of monetary policy autonomy (IMF, 2003). According to Akpan and Atan (2012) the exchange rate policy in Nigeria has gone through a substantial transformation from the fixed/regulated system in immediate post-independence period and the floating of the currency in 1986. In each of the eras, the exchange rate policy had important consequences for inflation, balance of payments and the real output. A managed floating exchange rate regime has been the most predominant since the introduction of Structural Adjustment Programme in 1986 in Nigeria (Akinmulegun & Falana, 2018).The real sector describes the sector of the economy where raw materials and other production factors such as labour, land and capital are utilized for production. The sector therefore forms the main hub of any economy, as well as the agent of economic growth and development (Adeusi &Aluko, 2015). The real sector comprises agriculture, industry, building and construction, and services (Sanusi, 2011). Recent studies have expanded the scope of the Nigeria real sector to include Agriculture, Industry, Building and Construction, Wholesale and Retail and Services in consistence with the Central Bank of Nigeria (CBN) reporting format (Mordi *et al*., 2013 and Amoo *et al.*, 2014).

2.2 Theoretical Literature

This study is constructed on Calvo (1999) version of the Mundell-Fleming IS/LM model, an economic model first set forth (independently) by Mundell (1963) and Fleming (1962). The model is an extension of the traditional IS-LM Model but unlike the traditional model, it describes an open economy and pre supposes the short-run

relationship between an economy's nominal exchange rate, interest rate, and output with the assumption that output is demand determined. The demand side of the economy consists of three markets namely, the goods, money and the foreign exchange market, the equilibrium of all of which is a pre condition for the economy to be in equilibrium. The Mundell-Fleming model provides understanding of how exchange rate is determined. In the model, the balance of international payments is considered as another equilibrium condition in addition to the money and goods markets (Kanamori & Zhao, 2006). Notwithstanding the advances in modelling techniques and the development of optimising models in the NOEM model, the insights provided by the Mundell-Fleming model in sectoral analysis, especially the disaggregation of output into sectors is unequalled (Kowalski, Paczynski and Rawdanowicz, 2003).

2.3 Empirical Literature on Exchange Rate and Real Output Performance

The empirical literature on the relationship between exchange rate regime and real output performance is extensive, particularly in the developed world where different researchers have adopted different methods and approaches. Early studies in the developed world and on few developing countries such as [such as Ghosh, Ostry, Gulde and Wolf (1997); Raddatz and Rigobon, (2003); Kowalski *et al*. (2003); Levy-Yeyati and Sturzenegger(2003); Miles (2006); Llaudes (2007)], those of developing countries [such as Moreno (2001); Kandil and Mizaie (2002); Bailliu, Lafrance and Perrault, (2003);Kandil (2004); Kyereme (2004); Broda (2004)] have been able to create the understanding of the effect of exchange rate regime on the economy and its component parts with divergent results. Kowalski, *et al* (2003) provided one of the prominent studies of the impact of exchange rate policy on the real economy from sectoral perspective. The study investigated the impact of exchange rate regime on tradable and non-tradable in a sample of selected Central and Eastern Europe (CEE) transition economies using VAR and PMG. The results found no firm or strong evidence of differential impact of exchange rate regime on the dynamics of output and prices of tradable and non-tradable. The study further revealed that the countries under investigation that adopted pegged regimes suffered from equally high (or even higher) volatility of effective nominal exchange rates than countries with floating regimes. Ghosh, Ostry, Gulde and Wolf (1997) conducted a descriptive analysis (means and standard deviation comparisons across regimes) of the growth performance under alternative regimes in 145 IMF-member countries for 30 years after 1960 and found a slightly higher GDP growth under a float (1.7% under floating compared to 1.4% under a peg). The study also found that higher productivity growth under a float supported the growth of external trade. Levy-Yeyati and Sturzenegger (2003) examined the relationship between exchange rate regimes and economic growth for a sample of 183 countries over the post-Bretton Woods period, using a new de facto classification of regimes. In contrast with previous studies, it was found that, for developing countries, less flexible exchange rate regimes are associated with slower growth, as well as with greater output volatility. For industrial countries, regimes do not appear to have any significant impact on growth. Broda (2004) measured the different consequences of macroeconomics shocks depending on exchange rate regime using a Semi-structural panel vector auto regression methodology to analyse the response of real GDP, real exchange rates and prices to negative terms of trade for 75 developing countries in the post- Bretton Woods period. The estimated impulse response functions for the fixed exchange rate regime pictured a moderate, three-year decline in GDP following a 10% permanent fall in terms of trade. No such statistically significant response was found for the floating exchange rate. Kyereme (2004) also found a significant long-run relationship between real output growth and the exchange rate regardless of the kind of policy or regime. Alam and Waheed (2006) used a VAR framework to investigate the monetary transmission mechanism in Pakistan at the sectoral level in the period 1973 - 2003. The results confirmed the existence of sector-specific variation to the real effects of monetary policy changes.

In Nigeria, the few empirical studies include Obi, Oniore and Nnadi (2016) which examined the impact of exchange rate regimes and output growth in Nigeria in different periods from 1970 to 2014. The study employed the Generalized Method of Moments (GMM) to estimate economic growth equation as a result of endogeneity problem with 1970-2014 data sourced from CBN statistical bulletin and World Bank's World Development Indicators for Nigeria. The study found strong empirical evidence that exchange rate regimes indeed matter in terms of real economic performance in Nigeria as the results revealed that deregulated exchange rate regime spur economic growth in Nigeria as against the whole period put together and fixed exchange rate regime. Yaqub (2010) investigated the relationship between Exchange Rate Changes and Output Performance in Nigeria; looking at just three subsectors of Agriculture, manufacturing and services. The study adopted the modified IS-LM framework using the seeming unrelated regression estimation technique to estimate data on Nigeria from 1970-2007. The results obtained indicated that exchange rate did not have the same effects on the three sectors. This study did not consider the effect of exchange regimes on the performance of the sectors investigated.

From the empirical literature, it is obvious that most of the empirical studies carried out on exchange - real output growth relationships, particularly in Nigeria lacked regime insight and also missed informative advantage in disaggregated approach. This is a critical shortcoming in

the literature. This study covered the five major sectors of agriculture, industry, building and construction, trade and services based on the Central Bank of Nigeria (CBN) disaggregated real output classification in line with the production boundary of the System of National Accounts (SNA). Beside the sectoral perspective, this study decomposed exchange rate into two regimes: regulated and guided deregulated exchange rate regimes and also covered a considerable period in both regimes.

3. THEORETICAL FRAMEWORK AND METHODOLOGY OF RESEARCH

This study is empirical and analytical in nature designed to quantitatively determine the relationship between exchange rate and the performance of components of real sector in Nigeria. Due to the nature of this study and the variables that are involved, ex-post facto design was adopted. Ex-post designs rely heavily on secondary (already computed) data.

3.1 Model Formulation

This study examines the performance of the five sectors of the real economy under regulated exchange regime (1961-1986) and guided deregulated regime (1987-2017). The theoretical construct of the model adopted is rooted in the Calvo (1999) version of the Mundell- Fleming IS-LM model, which describes an open economy and portrays the short-run relationship between an economy's nominal exchange rate, interest rate, and output with the assumption that output is demand determined.

Drawing from the theoretical and empirical literatures, the study uses an empirical model that replicates the expanded-form of the model in Kowalski, *et al.*(2003) which was a modified Calvo's (1999) version of the Mundell-Fleming model represented by the following equations:

$$y = \alpha * e + u\ ,\ \alpha > 0 \quad (3.1)$$

$$m = y + v \quad (3.2)$$

Where *y* denotes output, e the nominal exchange rate, *m* money (all in logarithms) and *u* and *v are stochastic* disturbances. Equation (3.1) represents an IS curve, and (3.2) an LM curve. In both equations interest rate effects are included in stochastic terms and elasticity of money in relation to output in (3.2) is set to unity.

The equations (3.1) and (3.2) can be rewritten as:

$$y = u \quad (3.3)$$

$$m = y + e + v \quad (3.4)$$

The above indicates that variance of output is equal to variance of real shock *u* independent of the exchange rate policy. Allusion was made to other studies such as Kandil (2004), Broda (2004) and Amoo *et al.* (2014).

3.2 The Model Specification

To provide an empirical work on the relationship between exchange rate and aggregate output in Nigeria, this study estimates Structural VAR (SVAR) using a seven-variable SVAR for the aggregate output (X_{it}). A separate SVAR is estimated for each sector of the economy to account for the effect of exchange rate on each sector. In estimating the SVARs, all variables enter the respective models in log-levels, except the variables which enter in their respective percentage terms.

The model is re-stated below:

$$AX_t = \alpha_o + C(L)\, X_{t-1} + B\varepsilon_t \quad (3.5)$$

Where $\mathbf{X}_t$ is a vector of syables comprising of outputs of the five components of the Nigerian real ,X_{t-1}*is* the lag variables,C (L) is a lag polynomial and ε_t is a vector of error terms.

The models of this study leans heavily on the Kowalski *et al* (2003) with some modifications. The adapted model is modified accordingly based on peculiarity of this research, the structure of data used and to accommodate some relevant variables in order to reflect the reality of Nigerian economy. Net Export is added to the models as an open economy indicator. Other relevant variables (such as government capital expenditure, government recurrent expenditure, total government expenditure, rainfall, credit to the private sector and index of electricity consumption) are added in disaggregated output equations which were presented accordingly in various models.

Two models are formulated based on the objectives of this study.

Model 1: Long run relationship between Exchange rate and aggregate real output in Nigeria.

For Model 1, which tests whether a long run relationship exists between exchange rate and aggregate real output in Nigeria, the null hypothesis of no long run relationship between Exchange Rate and Real Output Performance in Nigeria' is tested.

The model is specified in a functional form as stated below:

RGDP = *f* (NER, INF, PLR, NE, GCE, CPS)

The model can thus be written in econometrics form by specifying that:

$$RGDP_t = \beta_0 + \beta_1 NER_t + \beta_2 INF_t + \beta_3 PLR_t + \beta_4 NE_t + \beta_5 GCE_t + \beta_6 CPS_t + \mu_t \quad (3.6)$$

From the functional equation, Real Output (RGDP) is a function of Nominal Exchange Rate (NER), Inflation (INF), Prime Lending Rate (PLR), Net Export (NE), Government Capital Expenditure (GCE) and Credit to Private Sector (CPS).

The equation is represented in structural form below:

$$AY_t = \alpha_o + C(L)\, Y_{t-1} + B\varepsilon_t \quad (3.7)$$

Where

Y_t = vector of endogenous macroeconomic variables used in aggregate output (comprising aggregate real GDP, nominal exchange rate, inflation rate, Prime lending rate and Net Export, Government Capital Expenditures and Credit to the Private Sector). The Net Export was introduced to capture the export-import channel in the model. The variables were first transformed into natural logs (except the ones in percentage form) before computations, with a view to removing possible heteroscedasticity.

Y_{t-1} = a vector of the lagged values of endogenous variables,

ε_t= a vector of random error of disturbance terms for variable that captures exogenous factors.

C (L) = a matrix polynomial in the lag operator *L* of length *p,*

A = a matrix of *n ´ n* dimension, *n* is the number of variables, and

B = a column vector of dimension *n ×1*, which contains the contemporaneous response of the variables to the innovations or disturbances.

Model 2: Comparing the performance of the different components of real output in the regulated and deregulated exchange rate regimes in Nigeria.

A separate SVAR is estimated for each component sector of the economy in order to compare the performance of the different components of real output in the two alternative regimes- regulated and deregulated exchange rate regimes. The general structural VAR system constructed here is similar to model 2, except for Dummy variable that is added. Dummy is proxy for exchange rate regime; where 0 represents Regulated period and 1 represents Deregulated period, presented in SVAR equation as follows:

$$AY_t = \delta_0 + C(L)\,Y_{t-1} + B\varepsilon_t \tag{3.8}$$

Where

Y_t = vector of endogenous macroeconomic variables used in each of the sectors including the Dummy variable (DUM).

Y_{t-1} = a vector of the lagged values of endogenous variables of each of the sub-sector,

ε_t = a vector of random error of disturbance terms for every variable that captures exogenous factors.

C (L) = a matrix polynomial in the lag operator *L* of length *p,*

A = a matrix of *n ´ n* dimension, *n* is the number of variables, and

B = a column vector of dimension *n ×1*, which contains the contemporaneous response of the variables to the innovations or disturbances.

The structural VAR specification for the Agricultural output equation is given as:

$$\begin{pmatrix} \beta_{1i} \\ \beta_{2i} \\ \beta_{3i} \\ \beta_{4i} \\ \beta_{5i} \\ \beta_{6i} \\ \beta_{7i} \end{pmatrix} \begin{pmatrix} V_{1t}^{\Delta AGRICRGDP} \\ V_{2t}^{\Delta NER} \\ V_{3t}^{\Delta INF} \\ V_{4t}^{PLR} \\ V_{5t}^{NE} \\ V_{6t}^{RF} \\ V_{7t}^{CPS} \end{pmatrix} = \begin{pmatrix} \varepsilon_{1t}^{\Delta AGRICRGDP} \\ \varepsilon_{2t}^{\Delta NER} \\ \varepsilon_{3t}^{\Delta INF} \\ \varepsilon_{4t}^{PLR} \\ \varepsilon_{5t}^{NE} \\ \varepsilon_{6t}^{RF} \\ \varepsilon_{7t}^{CPS} \end{pmatrix} \tag{3.9}$$

Where i =1, 2, 3,4,5,6. From equation (3.9), exogenous variables from theoretical strand are restricted to response to other variables and endogenous variables are allowed to respond to contemporaneous changes from the endogenous variables and exogenous variables.

VAR is made up of n-variables which are $\frac{n(n+1)}{2}$ restrictions that are required for the system to be identified normalizing the diagonal element to one places n-restrictions on the VAR system. The difference between $\frac{n(n+1)}{2}$ and n implies that there are still $\frac{n(n-1)}{2}$ other identification restrictions needed. Sims (1980) proposed the recursive identification strategy in which the matrix of contemporaneous effects of structural shocks on the variables is assumed to be lower triangular and this yields the exactly needed other identification restrictions. However, the Sims strategy was criticized because re-ordering the variables yields different parameter estimates and hence results into a different shock magnitude. Cooley and LeRoy (1985) and Bernanke (1986) proposed the non-recursive structural relations among contemporaneous variables in the system. The matrix representing the identifying restrictions is presented in equation (3.10).

$$\begin{bmatrix} \mu_t^{AGRICRGDP} \\ \mu_t^{NER} \\ \mu_t^{INF} \\ \mu_t^{PLR} \\ \mu_t^{NE} \\ \mu_t^{RF} \\ \mu_t^{CPS} \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} & 0 & 0 & 0 & \beta_{16} & 0 \\ 0 & 1 & 0 & 0 & \beta_{25} & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ 0 & 0 & \beta_{43} & 1 & 0 & 0 & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{AGRICRGDP} \\ e_t^{NER} \\ e_t^{INF} \\ e_t^{PLR} \\ e_t^{NE} \\ e_t^{RF} \\ e_t^{CPS} \end{bmatrix} \tag{3.10}$$

It must be noted that certain exclusion restrictions on the structural parameters have become standard for studies of both closed and open economy macroeconomics literature. Following Ojede (2015) with little modification, since there is a lag period or gestation within the agricultural industry, we assume that farmers are unable to

respond contemporaneously to changes in macroeconomic variables, hence financial variables do not affect their decision. However, agricultural output is allowed to contemporaneously respond to shocks in exchange rate due to the huge importation of agricultural farm machineries and mechanized agricultural raw materials. Also, agricultural output is allowed to contemporaneously respond to rainfall amount as this will directly have impact on agricultural output when there is climate change as most of the farmers in developing country are still not using mechanized farming tools such as irrigation.

The extracted structural agricultural output shock equation from equation (3.10) can thus be specified as:

$$\mu_t^{AGRICRGDP} = \beta_{AGRICRGDP,NER} e_t^{NER} + \beta_{AGRICRGDP,INF} e_t^{INF} + \beta_{AGRICRGDP,PLR} e_t^{PLR} + \beta_{AGRICRGDP,NE} e_t^{NE} + \beta_{AGRICRGDP,RF} e_t^{RF} + \beta_{AGRICRGDP,CPS} e_t^{CPS} + \varepsilon_t^{AGRICRGDP} \quad (3.11)$$

The structural VAR specification for the Industrial output equation is given as:

$$\begin{pmatrix} \varphi_{1i} \\ \varphi_{2i} \\ \varphi_{3i} \\ \varphi_{4i} \\ \varphi_{5i} \\ \varphi_{6i} \\ \varphi_{7i} \\ \varphi_{8i} \end{pmatrix} \begin{pmatrix} \mathrm{V}_{1t}^{\Delta INDRGDP} \\ \mathrm{V}_{2t}^{\Delta NER} \\ \mathrm{V}_{3t}^{\Delta INF} \\ \mathrm{V}_{4t}^{\mathrm{PLR}} \\ \mathrm{V}_{5t}^{NE} \\ \mathrm{V}_{6t}^{IEC} \\ \mathrm{V}_{7t}^{GCE} \\ \mathrm{V}_{7t}^{CPS} \end{pmatrix} = \begin{pmatrix} \varepsilon_{1t}^{\Delta INDRGDP} \\ \varepsilon_{2t}^{\Delta NER} \\ \varepsilon_{3t}^{\Delta INF} \\ \varepsilon_{4t}^{\mathrm{PLR}} \\ \varepsilon_{5t}^{NE} \\ \varepsilon_{6t}^{IEC} \\ \varepsilon_{6t}^{GCE} \\ \varepsilon_{6t}^{CPS} \end{pmatrix} \quad (3.12)$$

Where i =1, 2, 3,4,5,6. From equation (3.12), exogenous variables from theoretical strand are restricted to response to other variables and endogenuous variables are allowed to respond to contemporaneous changes from the endogenous variables and exogenous variables. The matrix representing the identifying restrictions is presented in equation (3.13).

$$\begin{bmatrix} \mu_t^{INDRGDP} \\ \mu_t^{NER} \\ \mu_t^{INF} \\ \mu_t^{PLR} \\ \mu_t^{NE} \\ \mu_t^{IEC} \\ \mu_t^{GCE} \\ \mu_t^{CPS} \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} & 0 & 0 & 0 & \beta_{16} & \beta_{17} & 0 \\ 0 & 1 & 0 & 0 & \beta_{25} & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & 0 & \beta_{37} \\ 0 & 0 & \beta_{43} & 1 & 0 & 0 & 0 & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ \beta_{81} & \beta_{82} & \beta_{83} & \beta_{84} & 0 & 0 & \beta_{87} & 1 \end{bmatrix} \begin{bmatrix} e_t^{INDRGDP} \\ e_t^{NER} \\ e_t^{INF} \\ e_t^{PLR} \\ e_t^{NE} \\ e_t^{IEC} \\ e_t^{GCE} \\ e_t^{CPS} \end{bmatrix} \quad (3.13)$$

It must be noted that certain exclusion restrictions on the structural parameters have become standard for studies of both closed and open economy macroeconomics literature.

From equation 3.13, the row 1 shows the industrial output equation. From the row 1, exchange rate is allowed to have contemporaneous impact on industrial output and this is because most of the raw materials used in production are imported and so the price of import (exchange rate) will have immediate effect on output if there is a shock in the variable. Also, electricity consumption and government capital expenditure is allowed to have contemporaneous effect on industrial output and this is because infrastructure is a major determinant of government performance.

The extracted structural industrial output shock equation from equation (3.13) can thus be specified as:

$$\mu_t^{INDRGDP} = \beta_{INDRGDP,NER} e_t^{NER} + \beta_{INDRGDP,INF} e_t^{INF} + \beta_{INDRGDP,PLR} e_t^{PLR} + \beta_{INDRGDP,NE} e_t^{NE} + \beta_{INDRGDP,IEC} e_t^{IEC} + \beta_{INDRGDP,GCE} e_t^{GCE} + \beta_{INDRGDP,CPS} e_t^{CPS} + \varepsilon_t^{INDRGDP} \quad (3.14)$$

The SVAR specification for the Building and construction output equation is given as:

$$\begin{pmatrix} \chi_{1i} \\ \chi_{2i} \\ \chi_{3i} \\ \chi_{4i} \\ \chi_{5i} \\ \chi_{6i} \end{pmatrix} \begin{pmatrix} \mathrm{V}_{1t}^{\Delta BUILDRGDP} \\ \mathrm{V}_{2t}^{\Delta NER} \\ \mathrm{V}_{3t}^{\Delta INF} \\ \mathrm{V}_{4t}^{\mathrm{PLR}} \\ \mathrm{V}_{5t}^{GCE} \\ \mathrm{V}_{6t}^{CPS} \end{pmatrix} = \begin{pmatrix} \varepsilon_{1t}^{\Delta BUILDRGDP} \\ \varepsilon_{2t}^{\Delta NER} \\ \varepsilon_{3t}^{\Delta INF} \\ \varepsilon_{4t}^{\mathrm{PLR}} \\ \varepsilon_{5t}^{GCE} \\ \varepsilon_{6t}^{CPS} \end{pmatrix} \quad (3.15)$$

Where i =1, 2, 3,4,5. From equation (3.15), exogenous variables from theoretical strand are restricted to response to other variables and endogenous variables are allowed to respond to contemporaneous changes from the endogenous variables and exogenous variables. The matrix representing the identifying restrictions is presented in equation (3.16).

$$\begin{bmatrix} \mu_t^{BUILDRGDP} \\ \mu_t^{NER} \\ \mu_t^{INF} \\ \mu_t^{PLR} \\ \mu_t^{GCE} \\ \mu_t^{CPS} \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} & 0 & 0 & \beta_{15} & \beta_{16} \\ 0 & 1 & 0 & 0 & \beta_{25} & 0 \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} \\ 0 & 0 & \beta_{43} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & \beta_{65} & 1 \end{bmatrix} \begin{bmatrix} e_t^{BUILDRGDP} \\ e_t^{NER} \\ e_t^{INF} \\ e_t^{PLR} \\ e_t^{GCE} \\ e_t^{CPS} \end{bmatrix} \tag{3.16}$$

From equation (3.16), the first row represents the building structural equation. The structural restrictions show that building contribution to GDP is allowed to have a contemporaneous effect on building output. However, inflation rate and prime lending rate is restricted not to have contemporaneous effect on building output. This is because estate value follows a continuous upward appreciation in value and so, the level of interest rate nor inflation rate will not have an immediate (contemporaneous) effect on building contribution to GDP. As usual, no variable is allowed to have contemporaneous effect on government capital expenditure as this is exogenously determined. Also, only government capital expenditure is allowed to have contemporaneous effect on credit to private sector. This is because most of government capital expenditure is not financed through high powered money due to the inflationary nature of this mechanism, but is financed by borrowing from private investment; hence, this action is allowed to have contemporaneous effect on credit available to the private sector otherwise known as the crowding out effect on private investment.

The extracted structural building output shock equation from equation (3.16) can thus be specified as:

$$\mu_t^{BUILDRGDP} = \beta_{BUILDRGDP,NER} e_t^{NER} + \beta_{BUILDRGDP,INF} e_t^{INF} + \beta_{BUILDRGDP,PLR} e_t^{PLR} + \beta_{BUILDRGDP,GCE} e_t^{GCE} + \beta_{BUILDRGDP,CPS} e_t^{CPS} + \varepsilon_t^{BUILDRGDP} \tag{3.17}$$

The structural VAR specification for the Wholesale and Retail Trade output equation is given as:

$$\begin{pmatrix} \psi_{1i} \\ \psi_{2i} \\ \psi_{3i} \\ \psi_{4i} \\ \psi_{5i} \\ \psi_{6i} \\ \psi_{7i} \end{pmatrix} \begin{pmatrix} \mathrm{V}_{1t}^{\Delta TRADERGDP} \\ \mathrm{V}_{2t}^{\Delta NER} \\ \mathrm{V}_{3t}^{\Delta INF} \\ \mathrm{V}_{4t}^{\mathrm{PLR}} \\ \mathrm{V}_{5t}^{NE} \\ \mathrm{V}_{6t}^{GCE} \\ \mathrm{V}_{7t}^{CPS} \end{pmatrix} = \begin{pmatrix} \varepsilon_{1t}^{\Delta TRADERGDP} \\ \varepsilon_{2t}^{\Delta NER} \\ \varepsilon_{3t}^{\Delta INF} \\ \varepsilon_{4t}^{\mathrm{PLR}} \\ \varepsilon_{5t}^{NE} \\ \varepsilon_{6t}^{GCE} \\ \varepsilon_{7t}^{CPS} \end{pmatrix} \tag{3.18}$$

Where i =1, 2, 3,4,5,6. From equation (3.18), exogenous variables from theoretical strand are restricted to response to other variables and endogenuous variables are allowed to respond to contemporaneous changes from the endogenous variables and exogenous variables. The matrix representing the identifying restrictions is presented in equation (3.19).

$$\begin{bmatrix} \mu_t^{TRADERGDP} \\ \mu_t^{NER} \\ \mu_t^{INF} \\ \mu_t^{PLR} \\ \mu_t^{NE} \\ \mu_t^{GCE} \\ \mu_t^{CPS} \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} & 0 & \beta_{14} & \beta_{15} & \beta_{16} & 0 \\ 0 & 1 & 0 & 0 & \beta_{25} & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ 0 & 0 & \beta_{43} & 1 & 0 & 0 & \beta_{47} \\ \beta_{51} & \beta_{52} & \beta_{53} & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ \beta_{71} & \beta_{72} & \beta_{73} & \beta_{74} & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{TRADERGDP} \\ e_t^{NER} \\ e_t^{INF} \\ e_t^{PLR} \\ e_t^{NE} \\ e_t^{GCE} \\ e_t^{CPS} \end{bmatrix} \tag{3.19}$$

As with other structural restrictions, exchange rate is allowed to have contemporaneous effect on wholesale and retail trade. This is because given that many products are imported and the retailers and wholesalers are majorly into the distribution of this product. It follows that exchange rate changes will have immediate effect on wholesale and retail trade. Also, prime lending rate is allowed to have contemporaneous effect on wholesale and retail trade; this is because the interest rate will have immediate effect on the ability of the retailers to obtain loans from the financial sector. Also, inflation rate and net export will have contemporaneous effect on wholesale and retail trade.

The extracted structural Trade output shock equation from equation (3.19) can thus be specified as:

$$\mu_t^{TRADERGDP} = \beta_{TRADERGDP,NER} e_t^{NER} + \beta_{TRADERGDP,INF} e_t^{INF} + \beta_{TRADERGDP,PLR} e_t^{PLR} + \beta_{TRADERGDP,NE} e_t^{NE} + \beta_{TRADEGDP,GCE} e_t^{GCE} + \beta_{TRADERGDP,CPS} e_t^{CPS} + \varepsilon_t^{TRADERGDP} \tag{3.20}$$

The structural VAR specification for the Services output equation is given as:

$$\begin{pmatrix} \varpi_{1i} \\ \varpi_{2i} \\ \varpi_{3i} \\ \varpi_{4i} \\ \varpi_{5i} \\ \varpi_{6i} \\ \varpi_{7i} \end{pmatrix} \begin{pmatrix} V_{1t}^{\Delta SERVICERGDP} \\ V_{2t}^{\Delta NER} \\ V_{3t}^{\Delta INF} \\ V_{4t}^{NES} \\ V_{5t}^{PLR} \\ V_{6t}^{TGE} \\ V_{7t}^{CPS} \end{pmatrix} = \begin{pmatrix} \varepsilon_{1t}^{\Delta SERVICERGDP} \\ \varepsilon_{2t}^{\Delta NER} \\ \varepsilon_{3t}^{\Delta INF} \\ \varepsilon_{4t}^{NES} \\ \varepsilon_{5t}^{PLR} \\ \varepsilon_{6t}^{TGE} \\ \varepsilon_{7t}^{CPS} \end{pmatrix} \tag{3.21}$$

Where i =1, 2, 3,4,5,6. From equation (3.21), exogenous variables from theoretical strand are restricted to response to other variables and endogenuous variables are allowed to respond to contemporaneous changes from the endogenous and exogenous variables. The matrix representing the identifying restrictions is presented in equation (3.22).

$$\begin{bmatrix} \mu_t^{SERVICERGDP} \\ \mu_t^{NER} \\ \mu_t^{INF} \\ \mu_t^{NES} \\ \mu_t^{PLR} \\ \mu_t^{TGE} \\ \mu_t^{CPS} \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} & 0 & \beta_{14} & \beta_{15} & 0 & \beta_{17} \\ 0 & 1 & 0 & \beta_{24} & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} & \beta_{35} & \beta_{36} & \beta_{37} \\ \beta_{41} & \beta_{42} & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & \beta_{53} & 0 & 1 & \beta_{56} & \beta_{57} \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & \beta_{73} & 0 & \beta_{75} & \beta_{76} & 1 \end{bmatrix} \begin{bmatrix} e_t^{SERVICERGDP} \\ e_t^{NER} \\ e_t^{INF} \\ e_t^{NES} \\ e_t^{PLR} \\ e_t^{TGE} \\ e_t^{CPS} \end{bmatrix} \tag{3.22}$$

From equation 3.22, it can be seen that exchange rate is allowed to have contemporaneous shock on services sector contribution to GDP. The matrix also shows that net export on services is allowed to have contemporaneous shock on services contribution to GDP. However, no other variable is allowed to have contemporaneous shock on total government expenditure.

The extracted structural agricultural output shock equation from equation (3.22) can thus be specified as:

$$\mu_t^{SERVICERGDP} = \beta_{SERVICERGDP,NER} e_t^{NER} + \beta_{TSERVICERGDP,INF} e_t^{INF} + \beta_{SERVICERGDP,NES} e_t^{NES} + \beta_{SERVICERGDP,PLR} e_t^{PLR} + \beta_{SERVICERGDP,TGE} e_t^{TGE} + \beta_{SERVICERGDP,CPS} e_t^{CPS} + \varepsilon_t^{SERIVCERGDP} \tag{3.23}$$

3.3 Description and Measurement of Variables

For the purpose of empirical analyses, data on Real sector Output (proxied by Real GDPs) and Exchange rates in Nigeria were used. Economic indicators covered were the Real GDP of the aggregate sector and those of five disaggregated sectors, Exchange rate (proxied by Nominal Exchange Rate), Inflation rate, Interest rate (proxied by prime lending rate) and Net Export. Others variables across sub sectors are Total Government Expenditure (TGE), Government Capital Expenditure (GCE), Government Recurrent Expenditure (GRE), Rainfall (Rf), Credit to Private Sector and Index of Electricity Consumption (IEC). The Real GDP is the measure of economic performance used in this work. The Output of the component sectors represented by their GDP is defined as the value added by each of the 5 sub-sectors of the real sector of the economy.

Below are short descriptions of various variables adopted as proxies in the specification:

Table 1
Description and Measurement of Variables

S/N	Variable	Symbol	Measurement
1	Aggregate Output	RGDP	Aggregate RGDP measured in naira
2	Agricultural Output	Agric RGDP	Agric component of RGDP in naira
3	Industry Output	Ind RGDP	Industry component of RGDP in naira
4	Building & Cont. Output	Build RGDP	Building & Construction component of RGDP in naira
5	Trade (Commerce) Output	Trade RGDP	Trade component of RGDP in naira
6	Service Output	Service RGDP	Agric component of RGDP in naira
7	Nominal Exchange Rate	NER	Units of the Naira that can purchase a unit dollar
9	Inflation rate	INF	The Consumer Price Index (CPI) which is the average change over time in prices of goods and services consumed by people
9	Prime Lending Rate	PLR	Lending rate to less prime/ less risky real sector
10	Net Export	NE	Export minus Import (in Naira). Represent openness
11	Credit to Private Sector	CPS	Total financial resources provided by financial institution in Naira
12	Government Capital Expenditure	GCE	Spending on acquisition of goods and service for future benefit (in Naira)
13	Government Recurrent Expenditure	GRE	Spending on other purposes other than capital cost in Naira
14	Total Government Expenditure	TGE	Total Expenditure which is the addition of GCE and GRE in Naira
15	Rainfall	Rf	Quantity of rainfall in millimetres (mm)
16	Index of Electricity Consumption	IEC	Total electricity energy measured in watts or kilowatts

Source: Author's Compilation (2017)

3.4 Estimation Techniques

The analytical technique employed to achieve the objectives of the study and to have a holistic picture of the relationship between exchange rate and real sector output performance in Nigeria is the Structural Vector Autoregressive (SVAR). A Structural Vector Autoregression (SVAR) framework was conducted to analyse and provide empirical insight into the response of each of the five disaggregated sectors' output to the magnitude and speed of the impact of exchange rate shocks in Nigeria. Generally, in forecasting macroeconomic activities particularly a system of interrelated time series and tracing the effects of policy changes and external stimuli on the economy, VAR methodology has been found to be simple because it does not require a formal specification of the underlying theoretical model, useful for investigation of historical data dynamics, allows feedback and dynamic interrelationship across all the variables in the system, avoids the need for structural modeling by modeling every endogenous variable in the system as a function of the lagged values of all the endogenous variables in the system and is a natural approach to analyse the dynamics of sectoral output (Sim, 1980; Akinmulegun, 2012; Salisu, 2015).

The choice of VAR model requires two fundamental pre-tests- unit root and co integration tests. It has become a standard practice in empirical literature involving both time series and panel data to test for unit roots because economic and financial time series such as exchange rates and macroeconomic aggregates like real GDP exhibit trending behaviour or nonstationarity in their mean. Estimating models that contain non-stationary variables will often lead to a grave consequence of spurious results hence, pre-testing for unit roots and cointegration is often a first step in a typical time series modelling. Accordingly, a series of unit root test, such as Augmented Dickey-Fuller (ADF, 1981) and Phillips- Perron (1988) and Johannsen co-integration tests are used to determine the order of integration for each series.

The ADF test is based on the following regressions.

$$Dy_t = a_o + a_1 y_{t-1} + \sum_{\iota+1}^{n} a_1 Dy_i + et \qquad 3.24$$

Where:

y_{tis} a time series, t is a linear time trend, Δ is the first difference operator, a_o is a constant, n is the optimum number of lags on the dependent variable and e_t is the random error term.

This study also employed Philip-Perron test (1988); with the regression equation as follows:

$$DY_t = \alpha + \beta Y_{t-1} + \varepsilon_t \qquad 3.25$$

Co-integration test is the second test required to know time series properties of all the variables. The choice of the ARDL approach for cointegration test is based on consideration of its co integration analysis which is unbiased and efficient. The method is useful in estimating the short and long-run components of a model simultaneously; removing problems associated with omitted variables and autocorrelation (Narayan, 2004). The ARDL co-integration approach could also be used regardless of whether the underlying variables are *I(0)*, *I(1)* or fractionally integrated and it avoids the problem of too many choices that are to be made in Johansen method. According to Pesaran and Pesaran (1997), the augmented ARDL ($p, q_1, q_{2\ldots}, q_k$) can be written as follows:

$$\alpha(L,p)\, y_t = \alpha_o + \sum_{i=1}^{k} \beta_i (L,q_i)\, x_{i,t} + \varepsilon_t \qquad 3.26$$

Where α_o is a constant, y_t denotes the dependent variable, L is a lag operator, $x_{i,t}$ is the vector of repressors (where $i = 1, 2, \ldots, k$) and ε_t is the disturbance term.

In the long-run, we have

$$y_t = y_{t-1} = \ldots = y_{t-q} \text{ and } x_{i,t} = x_{i,t-1} = \ldots x_{i,t-q} \qquad 3.27$$

Where $x_{i,t-q}$ denotes q^{th} lag of the i^{th} variable.

The long run equation can be written as follows:

$$y_i = \alpha + \sum_{i=1}^{k} \beta_i x_i + \varepsilon_t \qquad 3.28$$

Moreover, the study used Summary Statistics of the Series in order to determine their inter-relationships**.** It presented annual descriptive statistics - mean, median, maximum, minimum standard deviation and Jarque-Bera statistic to test normality and evidence of skewness and the kurtosis. These descriptive statistics provide a historical background for the behaviour of data.

4. EMPIRICAL ANALYSIS AND PRESENTATION OF RESULTS

4.1 Descriptive Overview of Data

For proper conduct of analysis, it is imperative that a descriptive statistics be conducted on the core variables employed; this will help to provide a statistical background and characteristics of the variables. Hence, the descriptive statistics- mean, median, maximum, minimum, skewness, kurtosis and the Jarque-Berra statistics were employed in examining them. The statistics are presented on Table 2 and it relates the descriptive statistics of the variables employed. The variables examined are real GDP (RGDP), Industrial Sectoral contribution to GDP (INDRGDP), Building and Construction Sectoral contribution to GDP (BUILDRGDP), Trade Sectoral contribution to GDP (TRADERGDP), Services Sectoral contribution to GDP (SERVICERGDP), Agricultural Sectoral contribution to GDP (AGRICRGDP), Government Capital Expenditure (GCE), Credit to Private Sector (CPS), Exchange Rate (NER), Inflation rate (INF), Prime Lending Rate (PLR), Net Export (NE), Rain fall (RF), Index of Electricity Consumption (IEC), Net Export on Services (NES) and Total Government Expenditure (TGE). The data were available from 1961 till 2017 except for Rain fall, index of electricity consumption, net export and net export on services.

Table 2
Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skew	Kurt	Jarque-bera	Prob	Obs
RGDP	21.3 tri	17.3 tri	69.0 tri	2.50 bill	21.9 tri	0.86	2.65	7.32	0.026	57
AGRICRGDP	4.82 tri	3.33 tri	1.72 tri	1.34 bill	5.32 tri	0.96	2.62	9.10	0.011	57
INDRGDP	6.10 tri	7.10 tri	13.8 tri	172 mill	4.95 tri	-0.13	1.52	5.35	0.069	57
BUILDRGDP	651 bill	488 bill	2.68 tri	113 mill	756 bill	1.37	4.04	20.51	0.000	57
TRADERGDP	3.05 tri	2.16 tri	11.7 tri	311 mill	3.62 tri	1.26	3.36	15.46	0.000	57
SERVICERGDP	6.65 tri	4.29 tri	25.4 tri	347 mill	7.74 tri	1.22	3.35	14.49	0.001	57
GCE	254 bill	15.0 bill	1.16 tri	63766000	364 bill	1.24	3.14	14.66	0.001	57
CPS	2.84 tri	30.4 bill	22.3 tri	117 mill	5.98 tri	2.14	6.27	68.91	0.000	57
NER	53.93262	7.391558	305.2899	0.546358	75.53028	1.29	3.91	17.90	0.000	57
INF	15.83425	11.80000	72.73000	-5.6	15.16512	1.87	6.44	61.21	0.000	57
PLR	13.84213	16.02131	29.80000	6.000000	6.381159	0.33	2.11	2.92	0.232	57
NE	-7.4037	-10.8377	351.8886	-593.722	196.2250	-0.89	4.65	13.88	0.001	56
RF	409.5152	371.0000	1282.000	193.0000	236.0483	3.10	12.01	164.47	0.000	33
IEC	88.82314	87.05644	156.7330	28.57132	33.31014	0.19	2.40	0.936	0.626	44
NES	-34.1381	3.584555	398.5225	-1432.23	238.5413	-3.75	22.87	1033.3	0.000	55
TGE	1.08 tri	41.0 bill	8.30 tri	164 mill	1.86 tri	1.97	6.44	65.11	0.000	57

Source: Authors' construct using data extracts from CBN 2017 bulletin

From Table 2, real GDP grew from 2.5 billion naira to 69 trillion naira over the period under study; this shows that the economy has made tremendous impact in terms of their productive capacity over the period of study; this was also evidenced by the huge standard deviation of 21.9 trillion naira. Agricultural output also experienced a huge increase over the period of study; although it declined in growth pattern over the late 1980s due to the much concentration on oil resource as a major source of foreign exchange earnings; however it has been able to muster an increase from 1.3 billion naira to 1.72 trillion naira. Services contribution to GDP on average maintained the highest over other sectors as it mustered an average of 6.65 trillion naira over the industrial sector contribution to GDP of 6.10 trillion and then agricultural sector contribution to GDP of 4.82 trillion naira. It can however be concluded from the result that on average, the five sectors have tremendously increased over the period of study from billions to trillions of naira. Also, we cannot just overlook the other macroeconomic variables used in this study. Exchange rate dwindled from a minimum of 0.55 to a dollar to 305.29 naira to a dollar over the period of study. Inflation rate also experienced a fluctuation from (5.6%) to a maximum of 72.73% over the period of study. Total government expenditure also experienced a massive increase from 164 million naira experienced in 1961 to 8.30 trillion naira experienced in 2017. The Jarque-Berra test for normality shows that the variables of real GDP, Building and Construction Sectoral contribution to GDP, Trade Sectoral contribution to GDP, Services Sectoral contribution to GDP, Agricultural Sectoral contribution to GDP, Government Capital Expenditure, Credit to Private Sector, Exchange Rate, Inflation rate, Prime Lending Rate, Net Export, Rain fall, Net Export on Services and Total Government Expenditure are rejected implying that they are not normally distributed while the variables of Industrial Sectoral contribution to GDP, Index of Electricity Consumption and prime lending rate null hypothesis of normal distribution is rejected; the implying that they are not normally distributed.

4.2 Correlation Test

The next important descriptive statistics to conduct is a correlation test using the Pearson Correlation test technique.

Table 3
Correlation Result

	RGDP	IND RGDP	Build RGDP	Trade RGDP	Serv RGDP	GCE	CPS	NER	INF	PLR	NE	RF	IEC	NES	TGE
RGDP	1.00														
INDR GDP	0.99	1.00													
BUILD RGDP	0.92	0.92	1.00												
TRADE RGDP	0.99	0.99	0.92	1.00											
SERVICE RGDP	0.99	0.97	0.92	0.98	1.00										
GCE	0.63	0.56	0.56	0.59	0.70	1.00									

To be continued

Continued

	RGDP	Ind RGDP	Build RGDP	Trade RGDP	Serv RGDP	GCE	CPS	NER	INF	PLR	NE	RF	IEC	NES	TGE
CPS	0.65	0.55	0.58	0.59	0.72	0.88	1.00								
NER	0.62	0.52	0.55	0.56	0.69	0.86	0.95	1.00							
INF	0.22	0.25	0.18	0.27	0.20	-0.12	-0.08	-0.08	1.00						
PLR	0.81	0.81	0.63	0.81	0.79	0.45	0.47	0.49	0.37	1.00					
NE	0.07	0.11	-0.02	0.08	0.05	-0.23	-0.10	-0.13	0.15	0.18	1.00				
RF	0.29	0.20	0.24	0.22	0.35	0.48	0.72	0.69	-0.17	0.23	-0.13	1.00			
IEC	0.80	0.81	0.66	0.82	0.78	0.29	0.36	0.33	0.35	0.76	0.08	0.14	1.00		
NES	0.29	0.30	0.25	0.30	0.29	0.16	0.14	0.12	0.05	0.30	0.17	0.12	0.05	1.00	
TGE	0.65	0.56	0.58	0.59	0.72	0.96	0.97	0.96	-0.10	0.48	-0.18	0.63	0.33	0.14	1.00

Source: Authors' Construct using data extracts from CBN 2017 bulletin

The results of the Pearson Correlation test presented in Table 3 reveal that there is no perfect relationship existing amongst the variables; the implication of this is that there is no existence of perfect relationship between the dependent variable and the independent variables of each model, meaning that the problem of perfect multicollinearity is avoided. We can then seldom say that the models are not suffering from perfect multicollinearity.

4.3 Unit Root Test Result

This study employs the Augmented Dickey Fuller (ADF) test in order to verify the stationarity of the series. The variables tested are real GDP (RGDP), Industrial Sectoral contribution to GDP (INDRGDP), Building and Construction Sectoral contribution to GDP (BUILDRGDP), Trade Sectoral contribution to GDP (TRADERGDP), Services Sectoral contribution to GDP (SERVICERGDP), Agricultural Sectoral contribution to GDP (AGRICRGDP), Government Capital Expenditure (GCE), Credit to Private Sector (CPS), Exchange Rate (NER), Inflation rate (INF), Prime Lending Rate (PLR), Net Export (NE), Rain fall (RF), Index of Electricity Consumption (IEC), Net Export on Services (NES) and Total Government Expenditure (TGE). The result of the stationarity test as presented in Table 4 reveals that only inflation rate, net export and growth rate are stationary at levels while others are at first difference; implying that the order of stationarity are mixed.

Table 4
Unit Root Result

Variable	Method	At level I(0)			At first difference I(1)			Order of integration
		ADF statistic	ADF critical level	Probability	ADF statistic	ADF critical level	Probability	
GDP	ADF	-1.303511	-2.914517	0.6220	-7.424616	-2.915522	0.0000	I(1)
NER	ADF	3.553412	-2.914517	1.0000	-3.883083	-2.915522	0.0040	I(1)
INF	ADF	-3.495842	-2.914517	0.0117	-	-	-	I(0)
PLR	ADF	-1.425285	-2.915522	0.5634	-11.81199	-2.915522	0.0000	I(1)
NE	ADF	-5.523828	-2.915522	0.0000	-	-	-	I(0)
GCE	ADF	-1.154366	-2.914517	0.6879	-7.833138	-2.915522	0.0000	I(1)
CPS	ADF	0.203016	-2.914517	0.9705	-4.850990	-2.915522	0.0002	I(1)
AGRIC	ADF	-1.160927	-2.914517	0.6851	-7.366252	-2.915522	0.0000	I(1)
RF	ADF	-0.583567	-2.957110	0.8607	-6.221961	-2.960411	0.0000	I(1)
INDR	ADF	-1.624533	-2.914517	0.4636	-7.501942	-2.915522	0.0000	I(1)
IEC	ADF	-1.293715	-2.931404	0.6240	-8.837667	-2.933158	0.0000	I(1)
BUILD	ADF	-1.357095	-2.914517	0.5967	-7.618701	-2.915522	0.0000	I(1)
TRADE	ADF	-1.287907	-2.914517	0.6292	-7.243903	-2.915522	0.0000	I(1)
SERVICE	ADF	-1.294118	-2.914517	0.6263	-7.428073	-2.915522	0.0000	I(1)
NES	ADF	-6.835641	-2.917650	0.0000	-	-	-	I(0)
TGE	ADF	-0.787150	-2.914517	0.8149	-7.947723	-2.915522	0.0000	I(1)

Source: Authors' construct using data extracts from CBN 2017 bulletin

4.4 Co-integration Test

Given that there exists a mixed of order of stationarity, the appropriate co-integration technique to employ is the ARDL Bound test by Peseran, Shin and Smith (2001). The bound test results are presented in Table 5 below.

Table 5
Co-integration Result

Model	F-stat	I(0) Bound @ 5%	I(1) Bound @ 5%
Regulated Exchange Rate Regime	8.801897	2.45	3.61
Guided Deregulated Exchange Rate Regime	10.34452	2.45	3.61

Source: Authors construct using CBN 2017 bulletin.

Table 5 reveals that the F-statistics values of 8.801897 and 10.34452 for regulated exchange rate regime and guided deregulated exchange rate regime respectively are greater than the I(1) 5% critical bound value; the implication of this is that there exist a co-integration amongst the variable fundamentals. This also establishes long term relationship among the variables.

4.5 SVAR Result and Interpretation

This section presents the results of the Structural Vector Autoregression conducted to determine the response of the various sectors to a shock in exchange rate. The sectors examined are the Agricultural sector, Industrial sector, Building sector, Trade sector and services sector. For each of the sectors, impulse response and variance decomposition were conducted during the fixed exchange rate regime (1961-1985) and the guided deregulated regime (1986 - 2017).

4.5.1 Agricultural Sector

The variance decomposition and Impulse-response function for this sector is reported in Table 6, Figure 1 and Figure 2 respectively.

Table 6
SVAR Forecast Error Decomposition (FEVDs) of Agricultural Output

Variable Shocks	Regulated regime(1961-1986)			Guided deregulated regime(1987-2017)		
	Forecast horizon			Forecast horizon		
	Next 1 period	After 5 periods	After10 periods	Next 1 period	After 5 periods	After 10 periods
Agricultural contribution to GDP Shock	100.00%	28.79%	30.11%	1.17%	43.89%	76.48%
Exchange Rate Shock	0.00%	16.76%	10.74%	66.70%	22.75%	13.00%
Inflation Rate Shock	0.00%	16.90%	21.52%	0.79%	20.62%	7.79%
Prime Lending rate Shock	0.00%	21.62%	25.49%	1.15%	2.07%	0.50%
Net Export shock	0.00%	12.33%	8.58%	0.32%	8.80%	1.88%
Rain fall shock	0.00%	3.59%	3.55%	4.45%	0.30%	0.12%
Credit to private sector shock	0.00%	0.00%	0.00%	25.43%	1.57%	0.24%
Total accumulated shocks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's computation (2019)

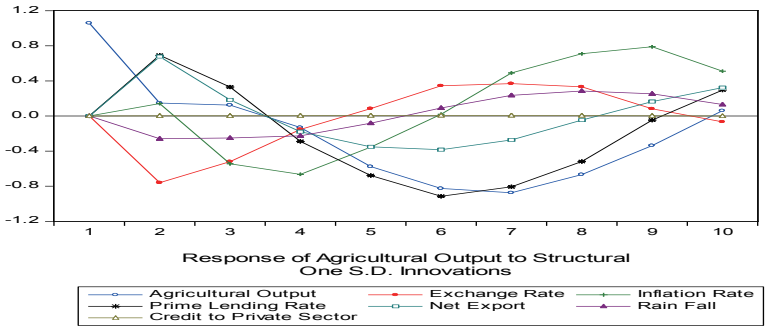

Figure 1
Response of agricultural output to shocks in the regulated regime (1961-1986)

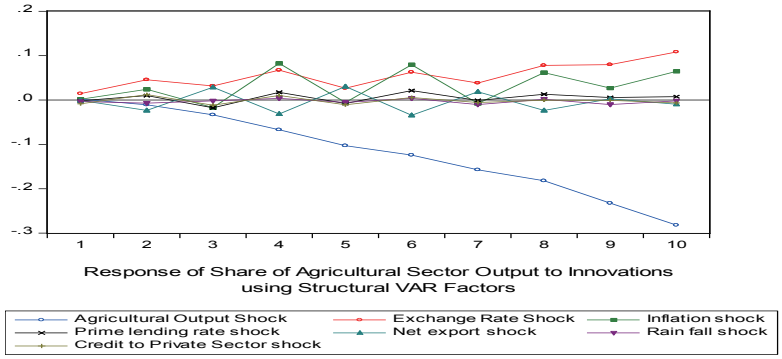

Figure 2
Response of agricultural output to shocks in the guided deregulated regime (1987-2017)

Figure 1 shows the accumulated responses of Agricultural output to the generalized one S.D. innovation in the regulated regime of which all of the variables are up to ten periods. As portrayed in Figure 1, in the regulated regime, Agricultural output responded negatively to exchange rate shocks from period 1 to the fifth period and then positively afterwards; the negative response was felt greatly in the second period. For the guided deregulated regime as portrayed in Figure 2, exchange rate responded positively throughout the ten periods with it greatly felt in the tenth period. Table 6 reveals that 0.00% of shocks in Agricultural output are explained by exchange rate in the first period during the regulated regime and this rose to 16.76% in the fifth period but endured a gradual decrease after the 10th period only accounting for 10.74% of shocks in Agricultural real output. In this regulated regime, prime lending rate accounted for the greatest shock in Agricultural output. However, in the guided deregulated regime, exchange rate accounted for 66.70% shock in agricultural output in the first period but declined greatly in the fifth and tenth period up till 22.75% and 13.00% respectively. This obviously showed that exchange rate accounted for the greatest shocks experienced on Agricultural output in the guided deregulated regulated regime than the regulated regime.

4.5.2 Industrial Sector

The variance decomposition and Impulse-response function for this sector is reported in Table 7, Figure 3 and Figure 4 respectively.

Table 7
SVAR Forecast Error Decomposition (FEVDs) of Industrial Output

Variable shocks	Regulated regime (1961-1986)			Guided deregulated regime (1987-2017)		
	Forecast horizon			Forecast horizon		
	Next 1 period	After 5 periods	After 10 periods	Next 1 period	After 5 periods	After10 periods
Industrial contribution to GDP Shock	0.06%	22.05%	18.85%	0.53%	21.88%	26.67%
Exchange Rate Shock	0.00%	7.98%	41.13%	19.36%	18.91%	17.24%
Inflation Rate Shock	7.98%	7.02%	5.02%	46.41%	17.82%	15.98%
Prime Lending rate Shock	1.44%	1.21%	0.79%	0.92%	16.67%	15.02%
Net Export shock	67.85%	51.27%	29.08%	0.03%	3.91%	3.24%
Industrial Electricity Consumption shock	15.41%	7.02%	3.55%	20.44%	11.64%	13.88%
Government Capital expenditure shock	4.86%	2.17%	1.00%	8.48%	5.78%	4.82%
Credit to private sector shock	2.39%	1.26%	0.58%	3.83%	3.38%	3.15%
Total accumulated shocks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's Computation (2019)

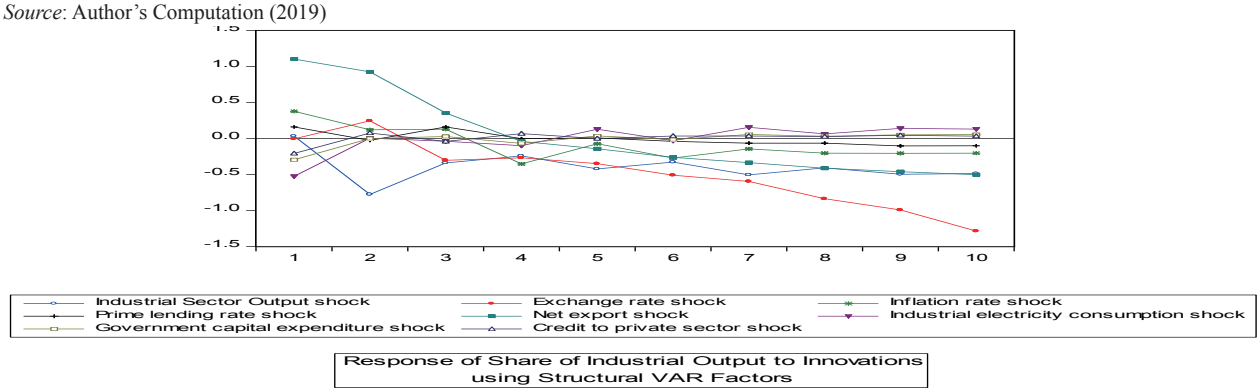

Figure 3
Response of industrial output to shocks in the regulated regime (1961-1986)

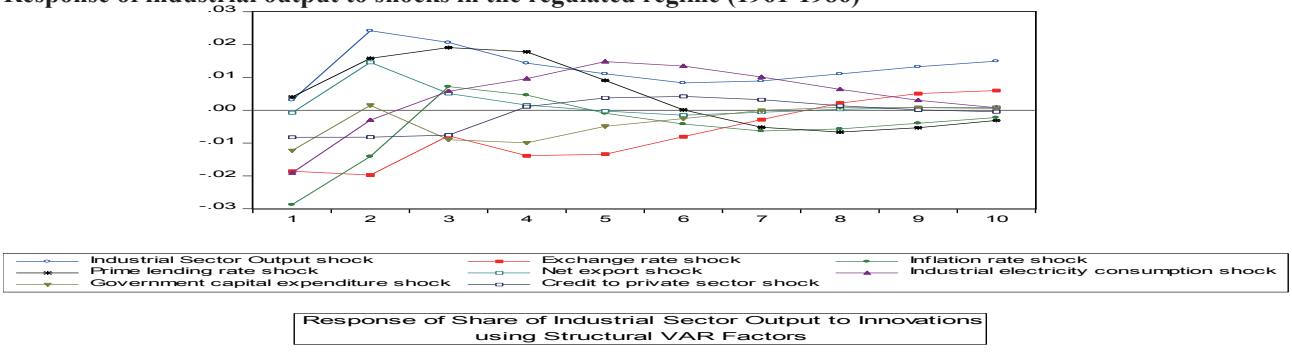

Figure 4
Response of industrial output to shocks in the guided deregulated regime (1987-2017)

Figure 3 shows the accumulated responses of Industrial output to generalized one S.D. innovation in the regulated regime of which all of the variables are up to ten periods. As portrayed in Figure 3, in the regulated regime, Industrial output responded positively to exchange rate shocks from period 1 to the second period and then negatively afterwards; the negative response was felt greatly in the tenth period. For the guided deregulated regime as portrayed in Figure 4, exchange rate responded negatively from the first period till the 8th period and then positively afterwards of which it was greatly felt in the second period. Table 7 reveals that 0.00% of shocks in Industrial output are explained by exchange rate in the first period during the regulated regime and this rose to 7.98% and 41.13% in the fifth and tenth period respectively. However, in the guided deregulated regime, exchange rate accounted for 19.36% shock in Industrial output in the first period but declined in the fifth and tenth period up till 18.91% and 17.24% respectively. This obviously showed that exchange rate accounted for the greatest shocks experienced on Industrial output in the long run during the guided deregulated regime than the regulated regime.

4.5.3 Building Sector

The variance decomposition and Impulse-response function for this sector is reported in Table 8, Figure 5 and Figure 6 respectively.

Table 8
SVAR Forecast Error Decomposition (FEVDs) of Building Output

Variable shocks	Regulated regime (1961-1986)			Guided deregulated regime (1987-2017)		
	Forecast horizon			Forecast horizon		
	Next 1 Period	After 5 Periods	After 10 Periods	Next1 Period	After5 Periods	After 10 Periods
Building contribution to GDP Shock	21.85%	16.13%	51.83%	0.39%	1.33%	16.83%
Exchange Rate Shock	60.65%	37.29%	23.72%	6.09%	38.34%	43.27%
Inflation Rate Shock	4.25%	24.81%	13.36%	7.42%	2.69%	3.70%
Prime Lending rate Shock	13.11%	11.98%	5.31%	1.83%	1.11%	0.55%
Government Capital expenditure shock	0.10%	5.39%	3.07%	38.09%	48.76%	3.83%
Credit to private sector shock	0.05%	4.40%	2.72%	46.17%	7.79%	3.82%
Total accumulated shocks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's Computation (2019)

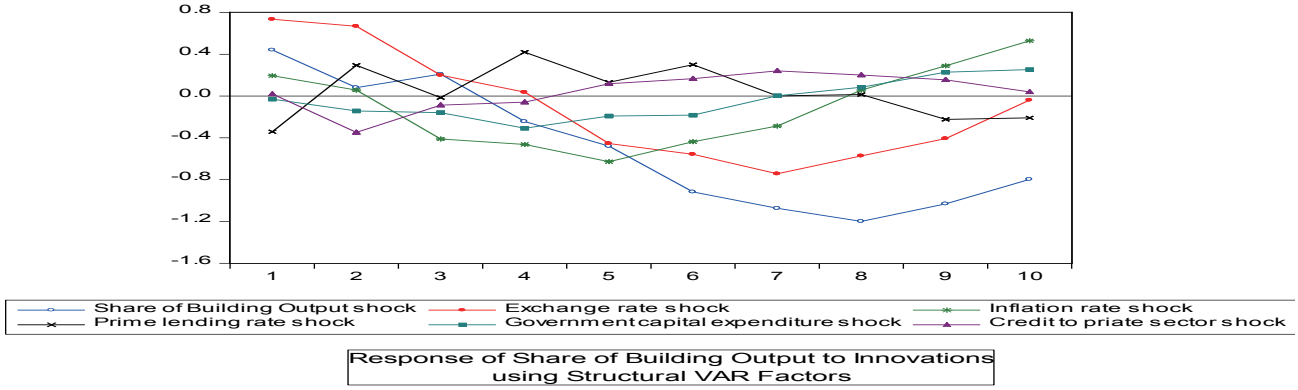

Figure 5
Response of building output to shocks in the regulated regime (1961-1986)

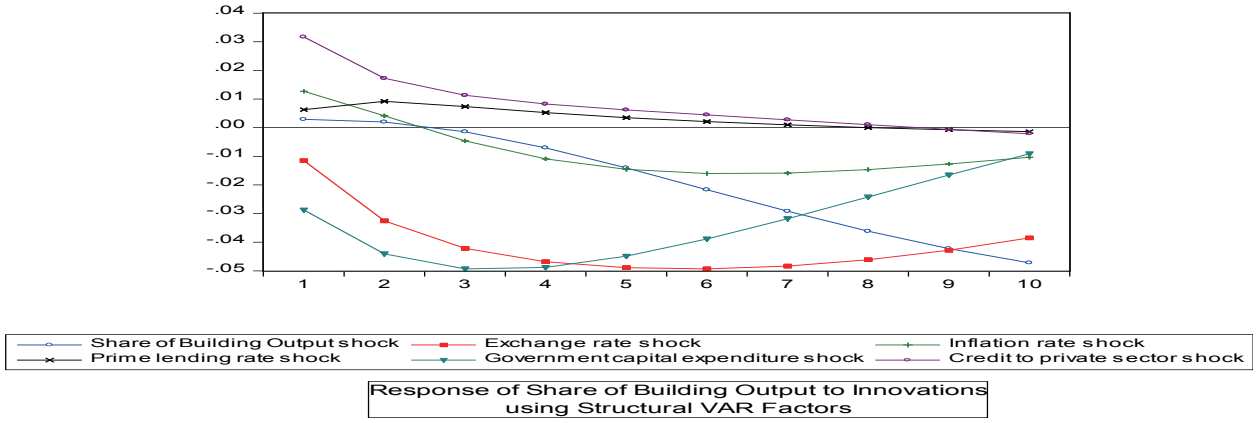

Figure 6
Response of building output to shocks in the guided deregulated regime (1987-2017)

Figure 5 showed the accumulated responses of Building output to generalized one S.D. innovation in the regulated regime of which all of the variables are up to ten periods. As portrayed in Figure 5, in the regulated regime, Building output responded positively to exchange rate shocks from the first period till the fourth period and then negatively afterwards; the negative response was felt greatly in the seventh period. For the guided deregulated regime as portrayed in Figure 6, exchange rate responded negatively from the first period till the tenth period and this was greatly felt in the fifth and sixth period. Table 8 reveals that 60.65% of shocks in Building output are explained by exchange rate in the first period during the regulated regime and this declined to 37.29% and 23.72% in the fifth and tenth period respectively. However, in the guided deregulated regime, exchange rate accounted for 6.09% shock in Building output in the first period and increased in the fifth and tenth period up till 38.34% and 43.27% respectively. This obviously showed that exchange rate accounted for the greatest shocks experienced on Building output in the short run during the regulated regime than the guided deregulated regime.

4.5.4 Trade Sector

The variance decomposition and Impulse-response function for this sector is reported in Table 9, Figure 7 and Figure 8 respectively.

Table 9
SVAR Forecast Error Decomposition (FEVDs) of Trade Output

Variable shocks	Regulated regime (1961-1986)			Guided deregulated regime (1987-2017)		
	Forecast horizon			Forecast horizon		
	Next 1 period	After 5 periods	After 10 periods	Next 1 period	After 5 periods	After10 periods
Trade contribution to GDP Shock	31.88%	0.10%	0.09%	1.36%	2.01%	15.72%
Exchange Rate Shock	34.60%	0.23%	0.25%	67.60%	66.43%	48.43%
Inflation Rate Shock	0.31%	27.44%	27.54%	1.98%	1.84%	2.42%
Prime Lending rate Shock	15.85%	3.22%	3.22%	0.60%	0.51%	0.53%
Net Export shock	0.15%	12.59%	12.55%	4.45%	4.67%	4.99%
Government Capital expenditure shock	16.69%	56.23%	56.16%	23.43%	24.30%	27.64%
Credit to private sector shock	0.52%	0.18%	0.18%	0.58%	0.24%	0.28%
Total accumulated shocks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's Computation (2019)

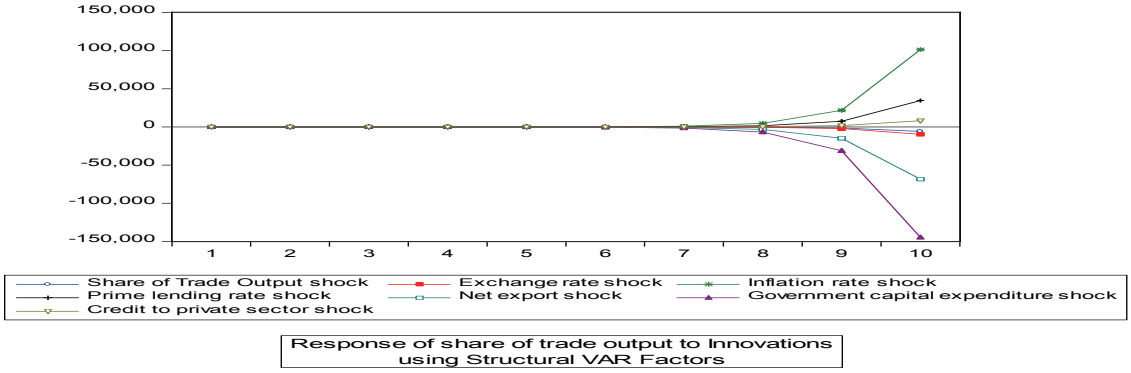

Figure 7
Response of trade output to shocks in the regulated regime (1961-1986)

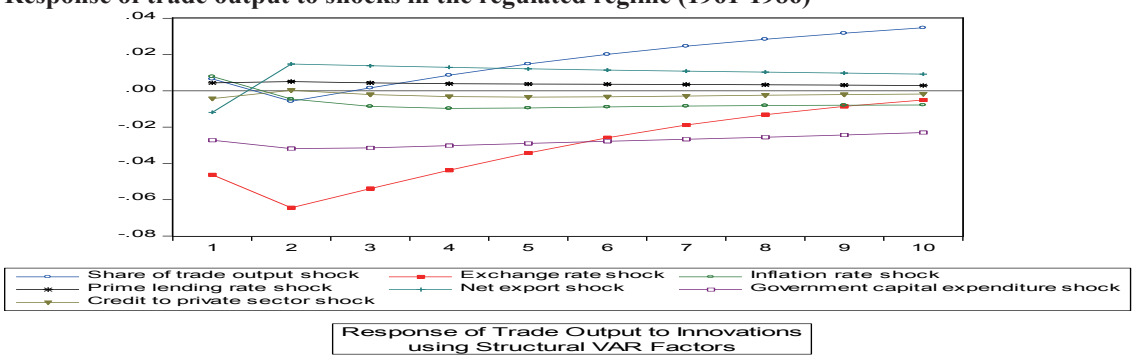

Figure 8
Response of trade output to shocks in the guided deregulated regime (1987-2017)

Figure 7 showed the accumulated responses of Trade output to the generalized one S.D. innovation in the regulated regime of which all of the variables are up to ten periods. As portrayed in Figure 7, in the regulated regime, Trade output did not responded to exchange rate shocks from the first period till the ninth period and then negatively afterwards; the negative response was only felt greatly in the tenth period. For the guided deregulated regime as portrayed in Figure 8, exchange rate responded negatively from the first period till the tenth period and this was greatly felt in the second period. Table 9 reveals that 34.60% of shocks in Trade output are explained by exchange rate in the first period during the regulated regime and this declined greatly to 0.23% and 0.25% in the fifth and tenth period respectively. However, in the guided deregulated regime, exchange rate accounted for 67.60% shock in Trade output in the first period and decreased in the fifth and tenth period up till 66.43% and 48.43% respectively. This obviously showed that exchange rate accounted for the greatest shocks experienced on Trade output in the short run during the guided deregulated regulated regime than the regulated regime.

4.5.5 Services Sector

The variance decomposition and Impulse-response function for this sector is reported in Table 10, Figure 9 and Figure 10 respectively.

Table 10
SVAR Forecast Error Decomposition (FEVDs) of Services Output

Variable shocks	Regulated regime (1961-1986)			Guided deregulated regime (1987-2017)		
	Forecast horizon			Forecast horizon		
	Next 1 period	After 5 periods	After 10 periods	Next 1 period	After 5 periods	After 10 periods
Services contribution to GDP Shock	12.71%	7.03%	30.83%	34.27%	27.93%	28.80%
Exchange Rate Shock	67.22%	49.35%	38.00%	8.25%	14.78%	32.14%
Inflation Rate Shock	4.54%	23.86%	16.24%	8.44%	21.00%	16.67%
Net Export on Services Shock	2.52%	1.10%	0.78%	1.41%	2.47%	2.26%
Prime Lending rate Shock	12.27%	9.76%	6.54%	0.60%	1.40%	1.75%
Total Government Expenditure shock	0.25%	4.83%	4.01%	38.54%	30.92%	17.75%
Credit to private sector shock	0.48%	4.07%	3.62%	8.50%	1.51%	0.62%
Total accumulated shocks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Author's Computation (2019)

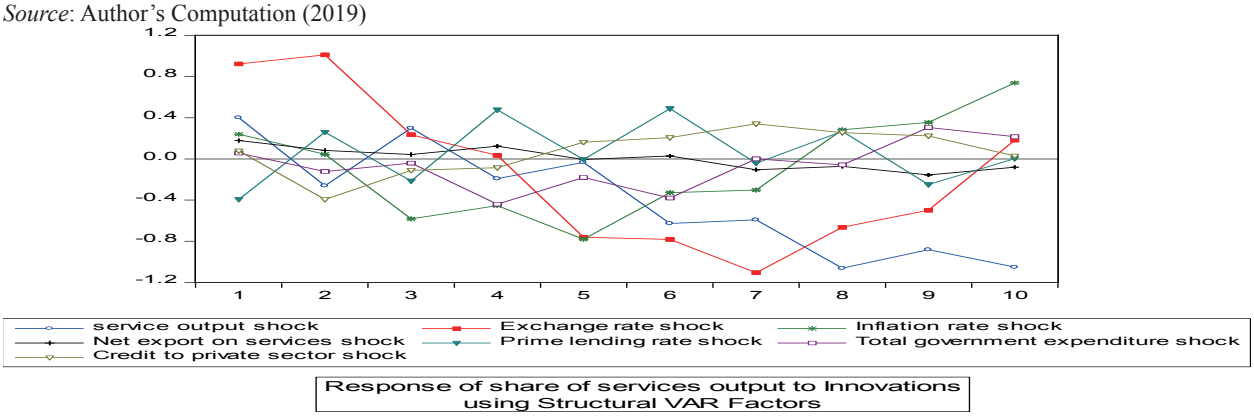

Figure 9
Response of services output to shocks in the regulated regime (1961-1986)

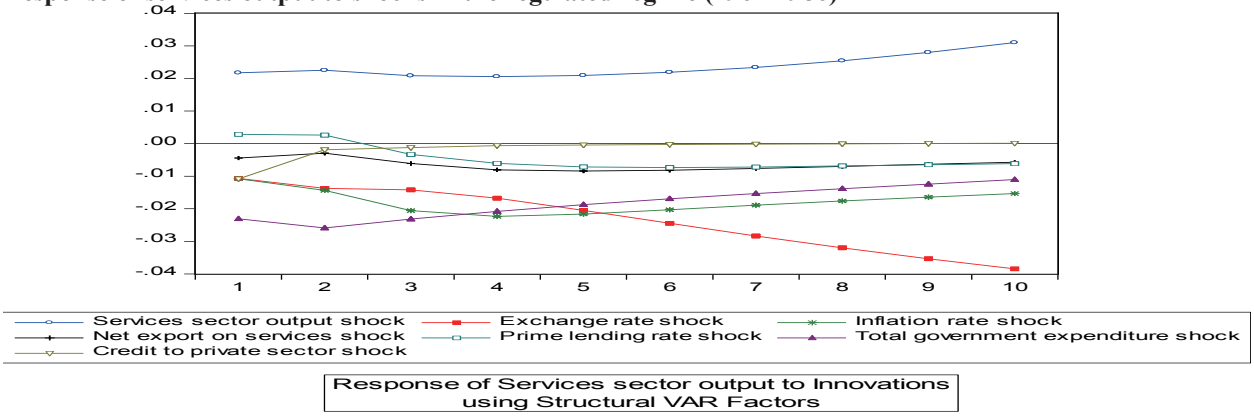

Figure 10
Response of services output to shocks in the guided deregulated regime (1987-2017)

Figure 9 showed the accumulated responses of Services output to the generalized one S.D. innovation in the regulated regime of which all of the variables are up to ten periods. As portrayed in Figure 9, in the regulated regime, Services output responded positively to exchange rate shocks from the first period till the fourth period and then negatively afterwards; the negative response was only felt greatly in the seventh period. For the guided deregulated regime as portrayed in Figure 10, exchange rate responded negatively from the first period till the tenth period and this was greatly felt in the tenth period. Table 10 reveals that 67.22% of shocks in Services output are explained by exchange rate in the first period during the regulated regime and this declined greatly to 49.35% and 38.00% in the fifth and tenth period respectively. However, in the guided deregulated regime, exchange rate accounted for only 8.25% shock in Services output in the first period and increased in the fifth and tenth period up till 14.78% and 32.14% respectively. This obviously showed that exchange rate accounted for the greatest shocks experienced on Services output in the short run during the regulated regime than the guided deregulated regime.

CONCLUSION

This study investigates the relationship between exchange rate regimes and the real sector performance in Nigeria. The scope of the study spans a period fifty-seven years (i.e. 1961 to 2017) and broken into two exchange regimes; regulated (1961-1986) and guided deregulated (1987-2017). The majority of theoretical and empirical investigations of exchange rate regimes to date have dealt primarily with aggregate and single sector variables and paid little attention to sectoral issues. However, this study examined the relationship between exchange rate and real output from the sectoral perspective. The study adopts the modified Mundell-Fleming IS-LM framework using the Structural Vector Autoregressive (SVAR).

Results from Impulse-Response Functions reveal an evidence of homogeneity in the response of the five dissagregated sectors' outputs to exchange rate under regulated exchange rate regime. In other words, the output of each of the five components of the real sector negatively and significantly responded to exchange rate movement in regulated regime. This findings have to be interpreted with caution as the direction of response may be similar for all the sectors in this regime, the magnitude (size), timing and persistence of responses varied from one sector to the other; confirming some degrees of disparity in the sensitivity of the sectors to exchange rate changes. However, a heterogeneous pattern of relationship is found in the responses of the sectors to exchange rate movement in the guided deregulated exchange rate regime. While Agriculture, Industry and Trade sectors responded positively to exchange rate, the other two sectors; Building/Construction and Services responded negatively to exchange rate under the guided deregulated regime. A typical explanation can be provided to this behaviour is that the building and construction sector in particular heavily depends on importation of machineries and production plants and even many building materials which are used for construction are imported. The implication of rising exchange rate on the sector will be higher cost of building and construction which results in higher cost of production; to this effect, the building and construction sector will be adversely affected by the exchange rate depreciation. Generally, these results established the fact that exchange rate regime adopted is significant and indeed matters to the performance of sectors of Nigerian real economy. The results of the Forecasting Error Variance Decompositions (FEVD) revealed that exchange rate accounted for greater shocks in output, especially in the long run in guided deregulated regime than the regulated regime in most of the sectors. The little variation in Construction and Services sectors is not enough to dispel this assertion. This gives the ground to reject the Hypothesis two that there is no significant difference in the performance of the different components of real output in the regulated and deregulated exchange rate regimes in Nigeria.

Overall, this study found a clear evidence of differential impact of exchange rate regimes on the dynamics of outputs of the five disaggregated real sectors in Nigeria in consistent with Broda (2004), Obi *et al* (2016) but in contrast with Moreno (2001), Bailliu *et al.* (2003). The study further established empirical evidence that exchange rate regimes indeed matter in terms of real economic performance in agreement with Falana (2018, 2019). The results further confirmed the presence of sector-specific variation to the real effects of exchange rate changes in agreement with Alam and Waheed (2006). Again, the study found evidence that the exchange rate channel is the most effective policy transmission channel to all the five sectors in line with Nwosa and Saibu (2012). This established empirically that the choice of exchange rate regime is important to the success of government effort to revamp the various sub sectors of the Nigerian real economy. It was found that exchange rate policy adopted is crucial for the performance of real sector in Nigeria. This calls for the need by Nigeria monetary policy maker to reassess the current guided deregulation with the intention of strengthening the controls and interventions to make it more effective and impact positively on the real sector of the economy. The Nigerian government should encourage rapid domestic productions and export promotion strategies in order to maintain a surplus balance of trade, create employment and reduce poverty level. Also, a conducive environment, adequate security, effective fiscal and monetary policy, as well as infrastructural facilities should be provided so that foreign investors will be attracted to invest in Nigeria.

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